

Australian Entomological Magazine

Aust. ent. Mag.



Volume 1, Part 4

September, 1973

A NOTE ON NATURAL ENEMIES OF *DANAUS PLEXIPPUS* (L.) (LEPIDOPTERA: NYMPHALIDAE) IN AUSTRALIA

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Introduction

During studies on population movements of *Danaus plexippus* (L.) (Wanderer Butterfly) in Australia some casual observations have been made on its natural enemies. As little has been recorded on these in Australia and as a detailed study is not likely to be made on them in the near future the observations are recorded here.

Virus Disease

The caterpillars of *D. plexippus* are subject to a virus disease. Although counts have not been made it is obvious that later instars are heavily attacked and that the disease may take heavy toll of dense populations of larvae. In stands of swan plant (*Gomphocarpus fruticosus*) which have been attacked to the point of defoliation there can often be seen the remains of caterpillars killed by the virus.

Bird Predators

The following species of birds have been observed attacking adults of *D. plexippus*: *Pachycephala rufiventris* (Lath.) (Rufous Whistler) and "Currawong" (Observation by A. D'Ombra); *Cuculus pallidus* (Lath.) (Pallid Cuckoo) (Obs. M. Dowling); *Coracina novaehollandiae* (Gmelin) (Black-faced Cuckoo-Shrike) (Obs. C. N. Smithers) and *Cacomantis pyrrhophanus* (Vieillot) (Fantailed Cuckoo) (Fagg, 1967). *Chibea bracteata* (G.) (Spangled Drongo) has been seen to ingest larvae but subsequently to regurgitate them (Obs. J. Orrell).

Mammal (?) Predator

Whilst sampling specimens early in the day for marking and release at an overwintering cluster site Miss Alana Peters collected specimens from a single cluster into a net. On removal it was found that many of the specimens, although still alive, were without an abdomen; some twenty or more were in this condition. The cluster was taken from the end of a branch and the predator would have had to be a fairly small, agile animal which could move through the cluster removing the abdomens without disturbing the butterflies. This is not impossible as the butterflies cling extremely tightly to their supports on cold nights and in order to remove them it is often necessary to place a net over a cluster and shake vigorously. Even then, many specimens may remain attached and torpid, those which are removed fluttering feebly

in the net. A small nocturnal predator could easily move over amongst such a cluster without causing the torpid butterflies to

Spiders

Adults have been seen trapped in webs and eaten by spiders (Obs. H. Hughes and C. N. Smithers), a small spider has been seen to feed on small larvae (Obs. U. Thompson) and a small green species of thomisid (*Diaea* sp.) has been seen to feed on small larvae one to two days old.

Insect Predators

A "Cockroach" and "ants" have been seen to feed on *D. plexippus* eggs and newly hatched larvae may eat eggs in addition to the shells of their own soon after hatching (Orrell, 1970). Mantids have been observed feeding on adults (Obs. H. Hughes and G. F. Smithers). *Oecia stollenbergi* Guérin (Family Pentatomidae) will feed on larvae and a species of wasp (Sphecidae: Larrinae) will take small larvae, presumably for nest-stocking (Obs. G. Willoughby).

Insect Parasites

Large numbers of tachinid parasites have been reared from *D. plexippus* pupae. Most of these have been *Winthemia diversa* Malloch but a few specimens of *Sturmia* sp. have also emerged. Not only tachinid parasites have been reared from the many hundreds of specimens which have been held in the laboratory. *W. diversa* has been recorded from many parts of its host's range.

In Queensland relatively few are parasitized by the tachinid in August-September but the fly population builds up quickly and in October-November about half the larvae are parasitized. By December-January 80-90% are parasitized (Obs. J. Liddy). In addition to the above observation the following notes have been made on *W. diversa* in the Sydney area.

Table I gives information on larvae collected at Camden in 1963/64 and at Bayview (Sydney) in 1968/69. In both cases a distinct increase in degree of parasitism is evident as the season progresses, the final percentage being very high, even reaching 100% in the February 1969 sample (22 specimens) from Bayview.

TABLE I
% parasitism of *D. plexippus* larvae by *W. diversa*

Camden			
Date of collection	No. of hosts	No. parasitized	% parasitized
18.xii.1963	106	1	0.9
2.i.1964	62	20	32.3
16.i.1964	23	16	69.6
6.ii.1964	11	9	81.8
Bayview			
9.x.1968	19	0	0
31.x.1968	4	0	0
28.xi.1968	7	6	85.7
17.i.1969	34	30	88.0
28.ii.1969	22	22	100.0

The eggs of *W. diversa* are laid almost anywhere on the outside of the host larvae appearing as small white, ovoid spots to the naked eye. Large numbers may be laid on one host (Table II); from one to nineteen have been observed on one host in the field. Females will lay on larvae already bearing eggs laid by other females. In the laboratory as many as thirty seven eggs were laid on one host exposed to several females; several received more than twenty eggs.

TABLE II
Numbers of eggs laid on *D. plexippus* by *W. diversa*
(52 hosts, 346 eggs)

Eggs/larva	No. of larvae	Eggs/larvae	No. of larvae
1	4	11	2
2	6	12	2
3	7	13	0
4	7	14	2
5	5	15	1
6	3	16	1
7	2	17	1
8	2	18	0
9	2	19	2
10	3		

Eclosion takes place in about four days. Of thirty two eggs observed, twenty nine hatched in four days and three in three days. The maggot leaves the egg and bores its way in through the larval integument nearby. Eggs have been found only on fourth and fifth instar hosts in the laboratory but it is not known whether maggots from those on fourth instar larvae survive; the females seem to lay mainly on fifth instar larvae in the field. As the duration of the egg stage lasts about four days, eggs laid less than four days before host pupation are shed with the larval skin and are lost. Development of the parasite maggot proceeds within the host pupa. This process has not been followed in detail but fully grown maggots emerge from the host pupa in five days from the time of pupation. Although many eggs may be laid on one host the maximum number of maggots to emerge from one pupa was seven (in fifty two hosts observed). When several maggots develop within a host the resulting flies are smaller than when only one parasite is present.

Having emerged from the host pupa the maggot drops to the ground and soon pupates in the soil. Of fifty eight parasite pupae forty nine produced adults in twelve days, five in thirteen days and four in eleven days. Adult flies are, therefore, on the wing about seventeen days after pupation of their host. It seems likely that there is a period of delayed development of the maggot at some time between entry into the host larva and emergence from the host pupa because the period between pupation of host and emergence of maggot from the host pupa is very uniform and quite short (about five days). This would not be so were development direct and continuous, as the period between parasite entry and host pupation varies greatly.

Despite the fact that *D. plexippus* is a comparative newcomer to the Australian fauna there is a wide range of biotic controlling factors operating on it; undoubtedly others will be observed and it is to be hoped that observers will record these so that the biology and ecology of *D. plexippus* will become better known.

Acknowledgements

I would like to thank the many co-operators who have provided information on natural enemies of *D. plexippus*, Mrs Robyn Jeffery for assistance in parasite rearing and Dr R. Crosskey for identifying tachinid parasites.

References

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A NEW FOODPLANT FOR *HYPOCHRYSOPS IGNITA* (LEACH) (LEPIDOPTERA: LYCAENIDAE)

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In January 1973 a lycaenid larva was observed moving down the stem of *Dodonaea triquetra* (Sapindaceae) at Kurrajong, N.S.W. The larva was attended by many small ants which, when crushed, gave a strong coconut smell. Further investigation showed that the upper surface of several leaves had been eaten in a manner similar to that of *Hypochrysops apelles* (Fabricius) and *H. digglesii* (Hewitson). Several larvae were taken from amongst dead leaves around the base of the plant. The larvae pupated and eventually emerged as *Hypochrysops ignita* (Leach). Fresh foodplant was unavailable towards the end of January and two larvae were still feeding. These were transferred to plum leaves which were readily accepted. Common and Waterhouse (1972) list twenty-one foodplant species (from a wide variety of families) including *Dodonaea attenuata* which was recorded as a foodplant of *Millmerran*, Queensland.

Common and Waterhouse (1972) state that larvae feed at night, returning to ant-byres at the base of the foodplant during the day. At Kurrajong a few larvae were to be found feeding around midday on three consecutive days.

Acknowledgement

Thanks are extended to the National Herbarium, Sydney, for plant identification.

Reference

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